

HW1 - 157b

1) • 3 platters = 6 surfaces with 150,000 track/platter

• Track has 4000 sectors of 1024 bytes

$$\frac{X/6}{150,000} = 1024 \text{ bytes}$$

Storage of disk
of surfaces

$$\frac{X}{6} = 1024(150,000) \rightarrow X = 6 \cdot 1024 \cdot 150,000$$

$$X = 921,600,000 \text{ bytes}$$

$$\begin{aligned} & \rightarrow 900,000 \text{ MB} \\ & \rightarrow 878.90625 \text{ GiB} \\ & \rightarrow 921.6 \text{ GB} \end{aligned}$$

4.)

• Disk spins @ 5400 RPM

$$\text{Average latency} \rightarrow \frac{1 \text{ min}}{5400 \text{ RPM}} \rightarrow \frac{60}{5400} \rightarrow \frac{11.1 \text{ ms}}{2 (\text{avg})} = 5.55 \text{ ms}$$

3.) • Time to move n tracks = $1 + .0002n$ ms

$$1 + .0002(15,000) = 3 \text{ ms}$$

Assuming we are not moving between cylinders and starting at the ~~innermost~~ innermost track, moving outward

2) Elevator

Cylinder	time req	time finished
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1000	0	31.8367
50,000	2	10.6789
80000	11	24.7578
44,0000	19	46.1156

Starting at 75,000 @
time 0. → Moving down

Avg Seek @

Avg latency @ 5.5 ms

* Calculate transfer time

Avg transfer @

10000	0	20.4789
50,000	2	35.9578
80000	11	50.0367
440000	19	62.9156

To calculate time finished.

Avg Latency + Avg Transfer + Seek time

$$(5.5) + (.1789) + (1 + .0002n) = \text{time completed}$$

$$\frac{5.8}{360} \cdot 11.1 = .1789 \text{ where } n = \# \text{ of tracks}$$

→ Assuming we're only reading one

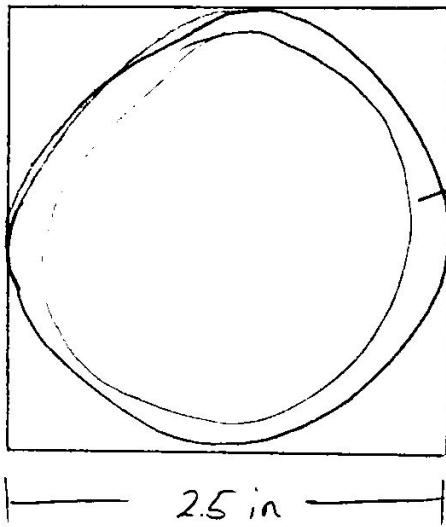
We'll assume a block is 4096 bytes

Gaps = 36° of Arc

Sectors = 324° of Arc

$$36 \times \frac{3}{1024} + 324 \times \frac{4}{1024} = \frac{135}{5.8}^\circ \text{ of Arc for 1 sector + gap}$$

1)



Track with 4000 sectors with 1024 byte

Outermost sector = ^{Circumference} ~~radius~~ of disk

$$C = \cancel{2\pi r} \text{ or } 2\pi r$$

$$2\pi(2.5) \rightarrow 5\pi \text{ in}$$

$$1 \text{ sector has } \frac{1024 \text{ bytes} \cdot 8}{5\pi \text{ in}} = 521.52 \text{ bits/in}$$

3.) a) Disks

1:	1	0	1	1	1	0	1	1
2:	1	1	0	0	0	0	1	1
3:	0	1	0	1	0	1	0	1
4:	1	1	0	1	0	0	1	0
	0	0	1	0	1	1	0	1

b.) Disks

1:	1	0	0	0	0	0	1	1
2:	1	0	0	1	0	0	1	1
3:	1	1	0	1	1	1	0	1
4:	0	0	1	1	0	0	1	0
	1	1	0	0	1	1	0	1